

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference G0003/7293WO	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2005/025987	International filing date (day/month/year) 21/07/2005	(Earliest) Priority Date (day/month/year) 22/07/2004
Applicant  GRAHAM PACKAGING PET TECHNOLOGIES INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☐ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 2

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

- b. ☐ none of the figures is to be published with the abstract.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2005/025987

## A. CLASSIFICATION OF SUBJECT MATTER

B65D1/02 B65D81/26 A23L3/3436 B32B27/08 B32B27/18  
C08K5/098 C08K5/17 C09K15/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C08K B32B B65D A23L C09K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 942 297 A (SPEER ET AL) 24 August 1999 (1999-08-24)	1-6, 9, 24-32, 37-41, 45, 60-68, 73-78, 81, 96-104, 108 109-113, 117, 131-139
A	column 3, line 8 - column 6, line 11  column 7, lines 20-52; examples claims  ----- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance  
 "E" earlier document but published on or after the international filing date  
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  
 "O" document referring to an oral disclosure, use, exhibition or other means  
 "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone  
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.  
 "&" document member of the same patent family

Date of the actual completion of the international search

22 November 2005

Date of mailing of the international search report

01/12/2005

Name and mailing address of the ISA

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Authorized officer

Lindner, T

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2005/025987

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p><del>US 5,196 469 A</del> (CUSHING ET AL) 23 March 1993 (1993-03-23)</p> <p>column 4, lines 36-65 claims; examples</p>	<p>1-5, 36-41, 72-77, 108-113</p>
A	<p><del>EP 0 526 977 A</del> (E.I. DU PONT DE NEMOURS AND COMPANY; FRITO-LAY, INC) 10 February 1993 (1993-02-10)</p> <p>page 3, lines 38-42</p>	<p>1-5, 36-41, 72-77, 108-113</p>
A	<p><del>US 6,565 938 B1</del> (TOYOSUMI MASAHIKO ET AL) 20 May 2003 (2003-05-20)</p> <p>column 9, lines 36-64; example 1</p>	<p>1,9, 24-28, 36,37, 45, 60-64, 72,73, 81, 96-100, 108,109, 117, 131-135</p>
A	<p>US 2003/235708 A1 (YANG HU ET AL) 25 December 2003 (2003-12-25)</p> <p>paragraphs '0011!, '0107! paragraphs '0019! - '0032!; claims 1-12</p>	<p>1,6-9, 24-28, 36,37, 42-45, 60-64, 72,73, 78-81, 96-100, 108,109, 114-117, 131-135</p>
A	<p>US 6 057 013 A (CHING ET AL) 2 May 2000 (2000-05-02) column 4, line 13 - column 9, line 5</p>	<p>1-142</p>
A	<p>US 6 323 288 B1 (KATSUMOTO KIYOSHI ET AL) 27 November 2001 (2001-11-27) examples 42-46; table 5 claims</p>	<p>1-142</p>
A	<p>EP 1 253 171 A (TOYO SEIKAN KAISHA LTD) 30 October 2002 (2002-10-30) page 8, line 24 - page 9, line 44; claims 1,3,7,8; example 12</p>	<p>1-142</p>

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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2005/025987

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98/06779 A (CHEVRON CHEM CO) 19 February 1998 (1998-02-19) page 4, line 5 - page 5, line 25; claim 2 -----	1-142
A	US 5 660 761 A (KATSUMOTO ET AL) 26 August 1997 (1997-08-26) column 3, line 33 - column 6, line 43 -----	1-142
A	WPI WORLD PATENT INFORMATION DERWENT, DERWENT, GB, vol. 19, no. 95 PA - TOYO SEIKAN KK PN - JP7067594 A, 1 September 1993 (1993-09-01), XP002035800 abstract -----	1, 36, 37, 72, 73, 108, 109
A	US 6 525 123 B1 (YANG HU ET AL) 25 February 2003 (2003-02-25)  claims; example 1 -----	1, 9, 24, 28, 36, 37, 45, 60-64, 72, 73, 81, 96-100, 108, 109, 117, 131-135
A	US 2002/098269 A1 (BANK VIRGINIA R ET AL) 25 July 2002 (2002-07-25)  paragraph '0010!; figure 1 paragraphs '0025!, '0031!, '0032! -----	10-23, 33-36, 46-59, 69-73, 82-95, 105-109, 118-130, 140-142

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2005/025987

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5942297	A	24-08-1999	AT 264189 T	15-04-2004
			DE 69728600 D1	19-05-2004
			DE 69728600 T2	14-04-2005
			EP 0794053 A2	10-09-1997
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			US 6287653 B1	11-09-2001
US 5196469	A	23-03-1993	AU 1759292 A	02-11-1992
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			EP 1152031 A1	07-11-2001
			WO 0136534 A1	25-05-2001
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			AU 721502 B2	06-07-2000
			AU 2064497 A	22-09-1997
			BR 9707824 A	27-07-1999
			CA 2247985 A1	12-09-1997
			CN 1215368 A	28-04-1999
			DE 69716047 D1	07-11-2002
			DE 69716047 T2	06-02-2003
			EP 0889781 A1	13-01-1999
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			HK 1017637 A1	16-05-2003
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			JP 2000506087 T	23-05-2000
			NZ 331990 A	28-02-2000
			WO 9732722 A1	12-09-1997
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EP 1253171	A	30-10-2002	NONE	
WO 9806779	A	19-02-1998	AT 213752 T	15-03-2002
			AU 724159 B2	14-09-2000
			AU 3963597 A	06-03-1998
			CA 2262604 A1	19-02-1998
			DE 69710734 D1	04-04-2002
			DE 69710734 T2	28-11-2002
			DK 918818 T3	25-03-2002
			EP 0918818 A1	02-06-1999
			ES 2173469 T3	16-10-2002
			JP 2001507045 T	29-05-2001
			NO 990674 A	19-03-1999
			NZ 333921 A	26-05-2000
			PT 918818 T	30-08-2002

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2005/025987

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5660761	A	26-08-1997	AT 198407 T	15-01-2001
			AU 699663 B2	10-12-1998
			AU 4774396 A	04-09-1996
			BR 9607276 A	15-12-1998
			CA 2211882 A1	22-08-1996
			DE 69611435 D1	08-02-2001
			DE 69611435 T2	11-10-2001
			DK 809447 T3	05-02-2001
			EP 0809447 A1	03-12-1997
			ES 2156271 T3	16-06-2001
			JP 3429773 B2	22-07-2003
			JP 11500349 T	12-01-1999
			NZ 302148 A	29-03-1999
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			US 5776361 A	07-07-1998
US 6525123	B1	25-02-2003	AU 6327901 A	03-12-2001
			CA 2408952 A1	29-11-2001
			CN 1430645 A	16-07-2003
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			WO 0190238 A2	29-11-2001
US 2002098269	A1	25-07-2002	US 6306450 B1	23-10-2001

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

## PCT

### WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/US2005/025987

International filing date (day/month/year)  
21.07.2005

Priority date (day/month/year)  
22.07.2004

International Patent Classification (IPC) or both national classification and IPC  
B65D1/02, B65D81/26, A23L3/3436, B32B27/08, B32B27/18, C08K5/098, C08K5/17, C09K15/06

Applicant  
GRAHAM PACKAGING PET TECHNOLOGIES INC.

#### 1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

#### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

#### 3. For further details, see notes to Form PCT/ISA/220.

File Folder	<input checked="" type="checkbox"/>	INITIAL
Client Info Access	<input checked="" type="checkbox"/>	
Docket Entry	<input checked="" type="checkbox"/>	
Docket Cross Off	<input checked="" type="checkbox"/>	
Order Copies	<input checked="" type="checkbox"/>	
Annulment	<input checked="" type="checkbox"/>	
Other	<input checked="" type="checkbox"/>	

Authorized Officer

DEC - 6 2005

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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2005/025987

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2005/025987

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or  
industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-142
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-6, 9, 24-32, 37-41, 45, 60-68, 73-78, 81, 96-104, 108
Industrial applicability (IA)	Yes: Claims	1-142
	No: Claims	

2. Citations and explanations

**see separate sheet**

Re Item V.

- 1 Reference is made to the following documents:

D1 : US 5 942 297 A (SPEER ET AL) 24 August 1999 (1999-08-24)

D2 : EP 0 526 977 A (E.I. DU PONT DE NEMOURS AND COMPANY; FRITO-LAY, INC) 10 February 1993 (1993-02-10)

D3 : US 5 196 469 A (CUSHING ET AL) 23 March 1993 (1993-03-23)

D4 : US 6 565 938 B1 (TOYOSUMI MASAHIKO ET AL) 20 May 2003 (2003-05-20)

- 2.1 The international application claims multilayer articles suitable for packaging of foodstuff, in particular beverages, which articles can be manufactured by blow molding.

The set of claims comprises independent claims which are directed to a preform for blow molding (known in the art as parison - claims 1 and 36), a plastic container having a multilayer wall (claims 37 and 72), a multilayer article (claims 73 and 108) and a method of making a multilayer plastic container (claim 109).

In essence, independent claims ~~36, 72, and 108~~ represent dependent claims which ~~group together essential features and preferred embodiments~~ of the invention.

- 2.2 The ~~concept~~ underlying the present invention resides in a combination of ~~two functionalities~~, namely the ability of a multilayer container such as a bottle to restrict or ~~inhibit the ingress of oxygen~~ which might impair the quality of the good which is stored in the container, be it by chemical or biochemical degradation, and the integrity of the multilayer container itself, i.e., proper ~~adhesion of the individual layers to one another~~.

The art has known two basic concepts in order to achieve the first goal, one being a ~~passive~~ system realized by the presence of a barrier for oxygen, the other one being an active system which scavenges oxygen by chemical reaction.

Both approaches are envisaged in the present independent claims.

With respect to an ~~active~~ oxygen barrier, recent developments focused on providing a polymeric system comprising ~~pendant~~ ethylenically unsaturated hydrocarbon residues

which after reaction with oxygen neither tend to degrade the polymer backbone nor to release harmful oxidation products.

In a non-prepublished application, the inventor envisioned an active oxygen barrier system which comprises terpene derivatives which in the past were regarded to act as antioxidants (US Provisional Application 60/473,024 - published as WO2004106426).

In a further application (US Application 10/688,432 - published as US2005084635), applicants suggested the addition of polyethylenimine (PEI) to at least one of the layers of a multilayer wall structure in order to promote adhesion between the layers.

### **Article 33(2) and (3) PCT**

- 3.1 The combination of the preferred embodiments is neither known nor suggested by a single citation included in the international search report.
- 3.2 The combination of the above-defined basic concepts (oxygen barrier and adhesion promotion) is taught by D1.

The independent claims envisage the presence of at least one layer of a matrix resin (which could be interpreted to provide for mechanical stability) and at least one layer of a barrier resin (which might be thin in comparison with the matrix layer), and an adhesion promoter and an active oxygen barrier composition being blended with the matrix resin and/or the barrier resin, whereby the adhesion promoter includes an amine polymer.

"Includes" is read to mean "comprises" rather than a merely covering a type of compounds.

An amine polymer further is regarded to differ from a polyamine such as tetramethylene pentamine (cf. Table 1, p.5, l.13, of D2).

Amines in general have been used in polymeric layers for various purposes. Concentrating on the role of PEI, one can firstly point to lines 20 to 35 at column 7 of D1 wherein polymeric amines including PEI are listed as scavengers for oxidation

products such as aldehydes and organic acids.

D2 specifically deals with the ability of certain amines to capture certain aldehydes and further states in lines 38 to 44 at page 3 that PEI is known as a primer for laminated film structures which can be used as packaging materials.

D3 demonstrates that a PEI primer layer promotes adhesion between an EVOH barrier layer and various polymers conventionally employed in packaging materials (including bottles - see col.4, l.55) such as ethylene vinylacetate (EVA - col.7, ll.38-52), poly(ethylene terephthalate (PET - Example 3), and polypropylene (col.5, ll.1-50).

Moreover, a PEI/cobalt complex may by itself act as oxygen scavenger (D4, col.9, ll.36-51).

Apart from these specific prior art teachings, it is evident that presence of an amine is advantageous in that it is capable of withholding acidic compounds.

3.3 D1 discloses in the working examples two complementary structures.

Example 2 shows the effect of scavenging of degradation products by a cast layer of PEI on the food contact side (layer A of LLDPE) of a multilayered oxygen scavenging packaging film comprising a matrix layer E of PET coated with an oxygen barrier layer of Saran and an oxygen scavenging layer B which contains 1,2-polybutadiene, a cobalt catalyst, and a UV-sensitive initiator.

Example 4 demonstrates as to how to overcome the drawback of having a PEI layer on the food contacting side of the multilayer film, namely by adsorbing it onto silica and incorporating it into layer A of Example 2.

The difference of the disclosure of Example 2 of D1 over the subject-matter of present independent claims 1, 37, and 73 resides in the fact that the oxygen barrier composition is neither blended with the barrier resin nor with the at least one layer of matrix, that the amine polymer is present in a separate layer, and that no explicit reference is made to plastic containers.

The two latter aspect are clearly envisaged in Example 4 and in lines 12 to 15 at

column 3 of D1.

D3 is silent about an adhesion promoting effect of PEI.

However, this will only be important in the context of adhering one layer to another one which in the absence of the amine polymer show only weak adhesion to one another, such as a barrier layer of EVOH next to a layer other than a polyamide layer as taught by D3 (col.4, ll.36-53).